

Macroeconomics is concerned with the **behavior of the economy as a whole**—with booms and recessions, the economy's total output of goods and services, and the rates of inflation and unemployment.

Why do prices go up rapidly at some times and not at others? Why are jobs plentiful in some years and not in others?

Shifts in the aggregate supply and aggregate demand schedules give us the tools to answer these questions.

The aggregate supply–aggregate demand model is the basic macroeconomic tool for studying output fluctuations and the determination of the price level and the inflation rate.

The aggregate supply (AS) curve describes, for each given price level, the quantity of output firms are willing to supply. The AS curve is upward-sloping because firms are willing to supply more output at higher prices.

The aggregate demand (AD) curve shows the combinations of the price level and level of output at which the goods and money markets are simultaneously in equilibrium. The AD curve is downward-sloping because higher prices reduce the value of the money supply, which reduces the demand for output.

The intersection of the AD and AS schedules at *E* determines the equilibrium level of output, and the equilibrium price level. **Shifts** in either schedule **cause the price level and the level of output to change.**

Before we go deeply into the factors underlying the aggregate demand and supply curves, we show how the curves will be used.

Suppose that the Fed increases the money supply. What effects will that have on the **price level** and on **output**? In particular, does an **increase in the money supply** cause the **price level to rise**, thus producing inflation? Or does the level of **output rise**? Or do **both output** and the price level rise?

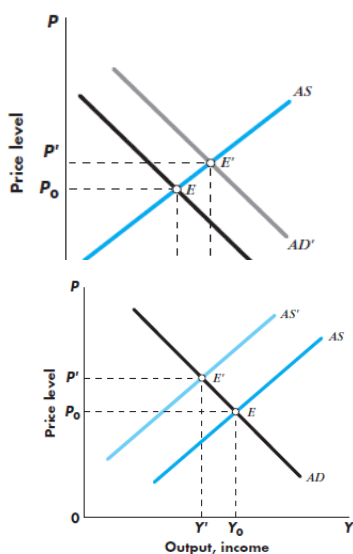


Figure shows that an increase in the money supply shifts the aggregate demand curve, AD, to the right, to AD'.

The shift of the aggregate demand curve moves the equilibrium of the economy from *E* to *E'*. The price level rises from *P*₀ to *P'* and the level of output from *Y*₀ to *Y'*.

Thus an **increase in the money stock** causes **both** the level of **output and the price level to rise**. It is clear from that the amount by which the price level rises depends on the slope of the aggregate supply curve as well as the extent to which the aggregate demand curve shifts and its slope.

Figure shows the results of an adverse (upward and leftward) aggregate supply Shock. The **leftward shift** of the aggregate supply curve **cuts output** and **raises prices**.

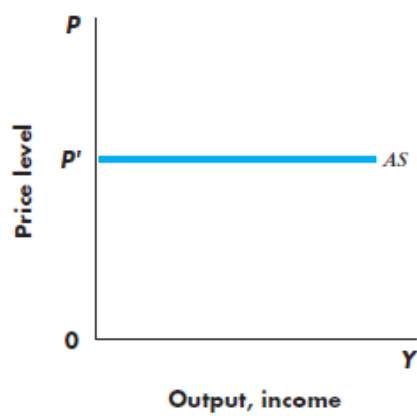
THE AGGREGATE SUPPLY CURVE

The aggregate supply curve describes, for each given price level, the quantity of output firms are willing to supply.

Prices responds *indifferently* in different *time horizons*.

In the short run the AS curve is horizontal (the *Keynesian* aggregate supply curve); in the long run the AS curve is vertical (the *classical* aggregate supply curve).

THE CLASSICAL SUPPLY CURVE



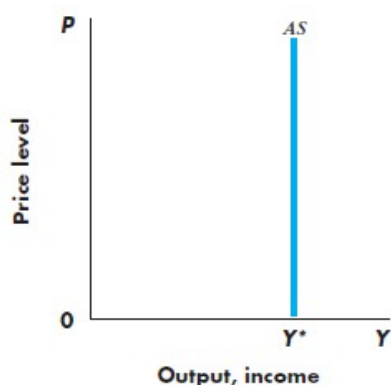
The *classical aggregate supply curve* is vertical, indicating that the same amount of goods will be supplied whatever the price level - is based on the assumption that the labor market is in equilibrium with full employment of the labor force.

In a single market, manufacturers faced with high demand can raise the price for their products and go out and buy more materials, more labor, and so forth.

This has the side effect of shifting factors of production away from lower demand sectors and into this particular market.

But if high demand is economy wide and all the factors of production are already at work, there isn't any way to increase overall production, and all that happens is that all prices increase.

THE KEYNESIAN AGGREGATE SUPPLY CURVE



The *Keynesian aggregate supply curve* is horizontal, indicating that firms will supply whatever amount of goods is demanded at the existing price level - is that because there is unemployment, firms can obtain as much labor as they want at the current wage.

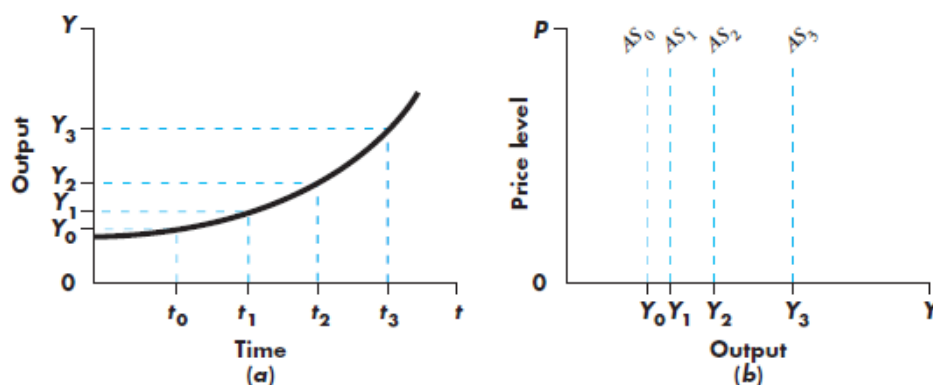
Their average costs of production therefore are assumed not to change as their output levels change.

They are accordingly willing to supply as much as is demanded at the existing price level.

"Short-run price stickiness." In the short run, firms are reluctant to change prices (and wages) when demand shifts. Instead, at least for a little while, they increase or decrease output. As a result, the aggregate supply curve is quite flat in the short run.

(a) The horizontal Keynesian AS curve implies that any amount of output will be supplied at the existing price level.

(b) The vertical classical supply function is based on the assumption that there is always full employment of labor, and thus that output is always at the corresponding level, Y^* .



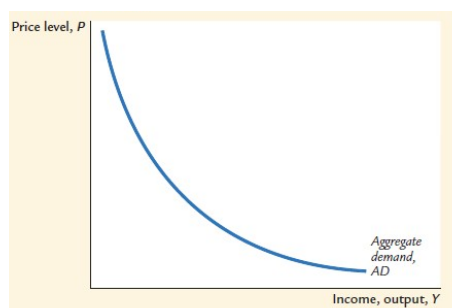
We call the level of output corresponding to full employment of the labor force *potential GDP*, Y^* .

Potential GDP grows over time as the economy accumulates resources and as technology improves, so the position of the classical aggregate supply curve moves to the right over time, as shown in Figure.

It is important to note that while potential GDP changes each year, the changes *do not depend on the price level*. We say that potential GDP is “**exogenous with respect to the price level**”;

We can draw a single vertical line at potential GDP and call it “**long-run aggregate supply**”

THE AGGREGATE DEMAND CURVE



The aggregate demand curve shows the combinations of the price level and level of output at which the goods and money markets are simultaneously in equilibrium.

The aggregate demand curve represents equilibrium in both the goods and money markets.

The key to the aggregate demand relation between output and prices is that aggregate demand depends

on the *real money supply*.

The real money supply is the *value* of the money provided by the central bank.

If we write the number of dollars in the money supply (the *nominal money supply*) as M and the price level as P , we can write the real money supply as (M/P) .

For a given level of the nominal money supply, M , high prices mean a low real money supply, (M/P) .

Quite simply, high prices mean that the *value* of the number of available dollars is low.

As a result, a high price level means a low level of aggregate demand, and a low price level means a high level of aggregate demand.

Thus, the aggregate demand curve depends on price level and slopes down when price increases.

The **quantity theory of money** provides a simple way to get a handle on the aggregate demand curve, even if it does leave out some important elements.

$$M \cdot V = P \cdot Y$$

where M is the money supply, V is the velocity of money (number of times per year a dollar turns over), P is the price level, and Y is the amount of output.

If the velocity of money is constant, then this equation states that the money supply determines the nominal value of output, which in turn is the product of the price level and the amount of output.

For example, a money supply of \$5,200 billion (M) turning over 2 times a year (V) would support a nominal GDP of \$10,400 billion ($P \cdot Y$).

The quantity equation can be rewritten in terms of the supply and demand for real money balances as

$M/P = (M/P)^d = kY$, where $k = 1/V$ is a parameter representing how much money people want to hold for every dollar of income. In this form, the quantity equation states that the supply of real money balances M/P equals the demand for real money balances $(M/P)^d$ and that the demand is proportional to output Y .

The velocity of money V is the flip side of the money demand parameter k .

If we make one additional assumption—that V is constant—then equation turns into an aggregate demand curve.

With the money supply constant, any increase in Y must be offset by a decrease in P , and vice versa. The inverse relation between output and price gives the downward slope of AD .

Why the Aggregate Demand Curve Slopes Downward

As a strictly mathematical matter, the quantity equation explains the downward slope of the aggregate demand curve very simply. The money supply M and the velocity of money V determine the nominal value of output PY . Once PY is fixed, if P goes up, Y must go down.

What is the economic intuition that lies behind this mathematical relationship? For a complete explanation of the downward slope of the aggregate demand curve, we have to wait for a couple of chapters. For now, however, consider the following logic: because we have assumed the velocity of money is fixed, the money supply determines the dollar value of all transactions in the economy. (This conclusion should be familiar from Chapter 5.) If the price level rises, each transaction requires more dollars, so the number of transactions and thus the quantity of goods and services purchased must fall.

We can also explain the downward slope of the aggregate demand curve by thinking about the supply and demand for real money balances. If output is higher, people engage in more transactions and need higher real balances M/P . For a fixed money supply M , higher real balances imply a lower price level. Conversely, if the price level is lower, real money balances are higher; the higher level of real balances allows a greater volume of transactions, which means a greater quantity of output is demanded.

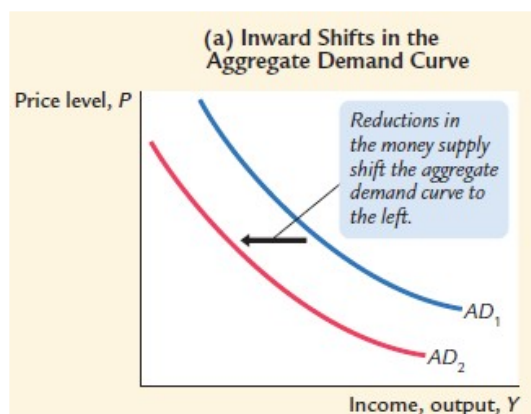
Shifts in aggregate demand.

An increase in the money supply shifts AD upward for any given value of Y .

Expansionary policies—such as increases in government spending, cuts in taxes, and increases in the money supply—move the aggregate demand curve to the right.

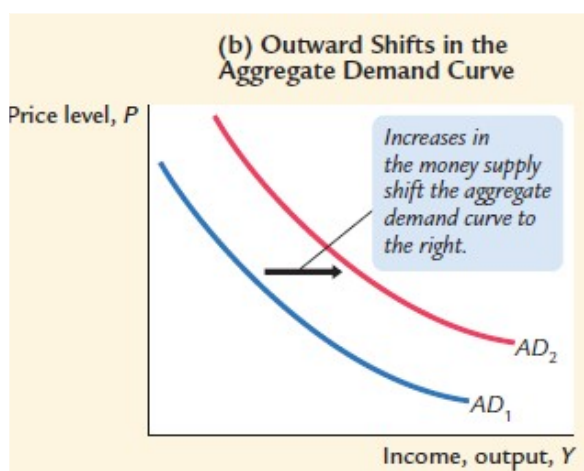
Expansion from the goods markets—say, from increased consumer confidence or expansionary fiscal policy—moves the aggregate demand schedule up and to the right.

Expansionary monetary policy similarly moves aggregate demand up and to the right.



The aggregate demand curve is drawn for a fixed value of the money supply. In other words, it tells us the possible combinations of P and Y for a given value of M . If the Fed changes the money supply, then the possible combinations of P and Y change, which means the aggregate demand curve shifts.

For example, consider what happens if the Fed reduces the money supply. The quantity equation, $MV = PY$, tells us that the reduction in the money supply leads to a proportionate reduction in the nominal value of output PY . For any given price level, the amount of output is lower, and for any given amount of output, the price level is lower. As in Figure panel (a), the aggregate demand curve relating P and Y shifts inward.



The opposite occurs if the Fed increases the money supply. The quantity equation tells us that an increase in M leads to an increase in PY . For any given price level, the amount of output is higher, and for any given amount of output, the price level is higher. As shown in Figure panel (b), the aggregate demand curve shifts outward.

Shifts in the Aggregate Demand Curve

Changes in the money supply shift the aggregate demand curve. In panel (a), a decrease in the money supply M reduces the nominal value of output PY . For any given

price level P , output Y is lower.

Thus, a decrease in the money supply shifts the aggregate demand curve inward from AD_1 to AD_2 . In panel (b), an increase in the money supply M raises the nominal value of output PY . For any given price level P , output Y is higher. Thus, an increase in the money supply shifts the aggregate demand curve outward from AD_1 to AD_2 .

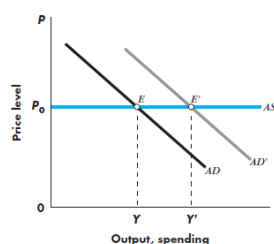
AGGREGATE DEMAND POLICY UNDER ALTERNATIVE SUPPLY ASSUMPTIONS

In Figure 5-1 we showed how the aggregate supply and demand curves together determine

the equilibrium level of income and prices in the economy. Now we use the aggregate demand and supply model to study the effects of aggregate demand policy in the two extreme supply cases—Keynesian and classical.

THE KEYNESIAN CASE

In Figure 5-9 we combine the aggregate demand schedule with the Keynesian aggregate supply schedule. The initial equilibrium is at point E , where AS and AD intersect. At that point the goods and assets markets are in equilibrium. Consider an increase in aggregate demand—such as increased government spending, a cut in taxes, or an increase in the money supply—which shifts the AD schedule out and to the right, from AD to AD' . The new equilibrium is at point E' , where output has increased. Because firms are willing to supply *any* amount of output at the level of prices P_0 , there is no effect on prices. The only effect in Figure 5-9 is an increase in output and employment.



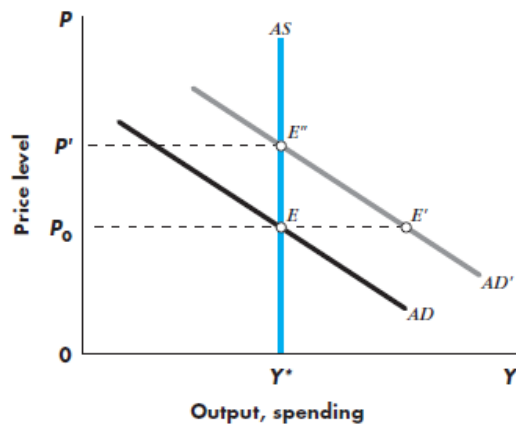
THE CLASSICAL CASE

In the classical case, the aggregate supply schedule is vertical at the full-employment level of output. Firms will supply the level of output Y^* whatever the price level. Under this supply assumption we obtain results very different from those reached using the Keynesian model. Now the price level is not given but, rather, depends on the interaction of supply and demand.

In Figure 5-10 we study the effect of an aggregate demand expansion under classical supply assumptions. The aggregate supply schedule is AS , with equilibrium initially at point E . Note that at point E there is full employment because, under the classical assumption, firms supply the full-employment level of output at any level of prices. The expansion shifts the aggregate demand schedule from AD to AD' . At the initial level of prices, P_0 , spending in the economy would rise to point E' . At price level P_0 the demand for goods has risen. But firms cannot obtain the labor to produce more output, and output supply cannot respond to the increased demand. As firms *try* to hire more workers, they bid up wages and their costs of production, so they must charge higher prices for their output. The increase in the demand for goods therefore leads only to higher prices, and not to higher output.

The increase in prices reduces the real money stock and leads to a reduction in spending. The economy moves up the AD' schedule until prices have risen enough, and

the real money stock has fallen enough, to reduce spending to a level consistent with full-employment output. That is the case at price level P' . At point E'' aggregate demand, at the higher level of government spending, is once again equal to aggregate supply.



SUPPLY-SIDE ECONOMICS

All economists are in favor of policies that move the aggregate supply curve to the right

by increasing potential GDP. Such supply-side policies as removing unnecessary regulation,

maintaining an efficient legal system, and encouraging technological progress are all desirable, although not always easy to implement. However, there is a group of politicians

and pundits who use the term “supply-side economics” in reference to the idea that cutting tax rates will increase aggregate supply enormously—so much, in fact, that tax collections will rise, rather than fall. Even political allies of the supply-siders (George Bush [the father] before he was president, for instance) refer to this notion as “voodoo economics.” We use the aggregate supply-aggregate demand diagram in Figure 5-11 to show what happens when tax rates are cut.

Cutting tax rates has effects on both aggregate supply and aggregate demand. The aggregate demand curve shifts right from AD to AD' . The shift is relatively large. The aggregate supply curve also shifts to the right, from AS to AS' , because lower tax rates

increase the incentive to work. However, economists have known for a very long time that the effect of such an incentive is quite small, so the rightward shift of potential GDP

is small. The large shift in aggregate demand and small shift in aggregate supply are illustrated in Figure 5-11.

What should we expect to see? In the short run, the economy moves from E to E' . GDP does rise substantially. As a result, total tax revenues fall proportionately less

than the fall in the tax rate. 6 However, this is purely an aggregate demand effect. In the

long run, the economy moves to E'' . GDP is higher, but only by a very small amount.

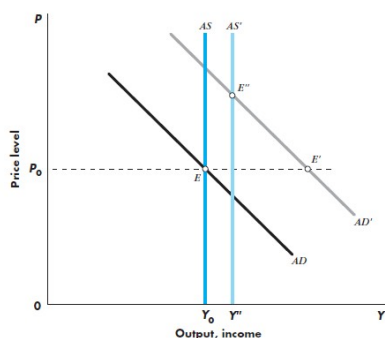
As a result, total tax collections fall and the deficit rises. In addition, prices are permanently higher.

The United States experimented with supply-side economics in the 1981–1983 tax cuts. The results were just as predicted.

Not *all* supply-side policies are silly. In fact, *only* supply-side policies can permanently increase output. Important as they are, demand management policies are useful only for short-term results. For this reason, many economists strongly favor supply-side policies—they just don’t believe in exaggerating their effect. 7 Many conservative economists

favor cutting tax rates for the small, but real, incentive effect. However, these economists also believe in cutting government spending at the same time. Tax collections would fall, but so would government spending, so the effect on the deficit

would be nearly neutral.



SUMMARY

- 1.** The aggregate supply and demand model is used to show the determination of the equilibrium levels of *both* output and prices.
 - 2.** The aggregate supply schedule, AS , shows at each level of prices the quantity of real output firms are willing to supply.
 - 3.** The Keynesian supply schedule is horizontal, implying that firms supply as many goods as are demanded at the existing price level. The classical supply schedule is vertical. It would apply in an economy that has full price and wage flexibility. In such a frictionless economy, employment and output are always at the full-employment level.
 - 4.** The aggregate supply curve describes the dynamic price adjustment mechanism of the economy.
 - 5.** The aggregate demand schedule, AD , shows at each price level the level of output at which the goods and assets markets are in equilibrium. This is the quantity of output demanded at each price level. Along the AD schedule fiscal policy is given, as is the nominal quantity of money.
 - 6.** A fiscal expansion shifts the AD schedule outward and to the right. An increase in the nominal money stock shifts the AD curve up by the same proportion as the money stock increases.
- Supply-side economics makes the claim that reducing tax rates generates very large increases in aggregate supply. In truth, tax cuts produce very small increases in aggregate supply and relatively large increases in aggregate demand.
- 8.** Over long periods, output is essentially determined by aggregate supply and prices are determined by the movement of aggregate demand relative to the movement of aggregate supply.

RECAP

We summarize the description of the aggregate supply schedule as follows:

- A relatively flat aggregate supply curve means that changes in output and employment have a small impact on prices, as shown in Figure 5-6 *a*. Equivalently, we could say that the horizontal short-run AS curve shown in Figure 5-6 *b* moves up slowly in response to increases in output or employment. The coefficient α in equation (1) captures this output/price change linkage.
- The position of the short-run AS schedule depends on the level of prices. The schedule passes through the full-employment level of output, Y^* , at $P_t = P_{t-1}$. At higher output levels there is overemployment, and hence prices next period will be higher

than those this period. Conversely, when unemployment is high, prices next period will be lower than those this period.

- The short-run AS schedule shifts over time. If output is maintained above the full employment level, Y^* , prices will continue to rise over time.